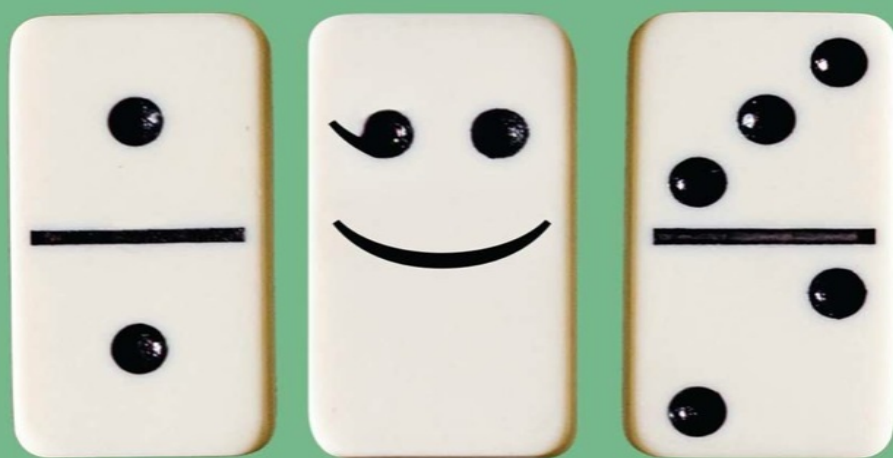


SHORTCUT

HOW ANALOGIES REVEAL
CONNECTIONS, SPARK INNOVATION,
AND SELL OUR GREATEST IDEAS



JOHN POLLACK

author of *The Pun Also Rises*

Advance Praise for

SHORTCUT

“Our minds work like supercomputers, processing impossibly vast amounts of information, creating patterns and parallels to make sense of all the data. *Shortcut* reveals how, through analogies (like the one in the previous sentence!), we understand our world and ultimately, ourselves. A fascinating read.”

—David Zweig, author of *Invisibles: The Power of Anonymous Work in an Age of Relentless Self-Promotion*

“Pollack offers up an unparalleled feast of analogies, digging deep into his extensive experience as a writer to show why analogy is important, how it’s constructed, and what makes it effective. *Shortcut* to analogies what *Joy of Cooking* is to brisket.”

—Benjamin K. Bergen, director of the Language and Cognition Lab at the University of California, San Diego, and author of *Louder Than Words*

“Anyone who has ever tried to find the right analogy to win an argument, to settle a dispute, to persuade squabblers to compromise—or who wants to avoid making things worse by using the wrong analogy—should read this insightful book!”

—Suzanne R. Butler, PhD, JD, member of the National Academy of Arbitrators

Also by John Pollack

The Pun Also Rises

Cork Boat

SHORTCUT



How Analogies Reveal Connections, Spark
Innovation, and Sell Our Greatest Ideas

JOHN POLLACK



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To my mom and dad, who show me what is possible

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*There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;*

*Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat;
And we must take the current when it serves,
Or lose our ventures.*

William Shakespeare, Julius Caesar, Act 4, Scene 3

INTRODUCTION

BOARDING THE SHIP OF STATE

I tried to look confident but, sitting awkwardly on a yellow couch in the West Wing of the White House, I couldn't get comfortable. Across the room, behind a big wooden desk, sat the chief speechwriter for the president of the United States, scrutinizing my résumé.

Decades earlier, perhaps during the Johnson years, the couch on which I sat had begun its life as a handsome piece of furniture. But after bearing the brunt of many administrations and more than a few crises, its springs were spent. If I leaned back, I'd be swallowed by cushions. If I scooted forward, I might end up on the floor. On edge, I waited.

Only a day earlier, I had been sitting in my fifth-floor walk-up apartment in Dupont Circle—unshaven, unemployed, and uncertain about my future. The call from the White House had caught me by surprise. While I had worked for several years as a speechwriter on Capitol Hill and had twice applied to become a presidential speechwriter, I hadn't been selected. Now one of the president's speechwriters was moving on, and there was an opening. Would I come in for an interview?

When the chief speechwriter, Terry Edmonds, finally looked up, he pushed his glasses to the top of his head. "Your writing is good," he said. "I have no doubt you can do the job. But you have a lot of other . . ." He paused, searching for the right word. "You have a lot of other . . . projects. What is this *cork boat*?" The way he said those words, I knew it wasn't just a question but something of a challenge.

He was asking about the last line on my résumé: *Currently building the world's first cork boat*. I explained that I was saving a hundred thousand wine-bottle corks to build a boat modeled after a Viking ship, which I planned to take on a voyage through French wine country. Building the boat had been a boyhood dream, and I was determined to see it through.

As Edmonds' eyes narrowed, I could feel my last chance to work at the White House ebbing away. But at that moment, as both my career and I teetered on the edge of that couch, an analogy sprang to mind.

"Sir, building a cork boat is a lot like writing a good speech. . . ."

Edmonds' head tilted; his eyebrows rose. It was too late to retreat. "In both cases," I explained, "you take a jumble of small things—corks or words—that don't do much on their own. But if you assemble them carefully, and put them into just the right order, they'll carry you on the most amazing journey."

And then I shut up.

For a long moment, Edmonds stared at me. Then a grin spread across his face, and he shook his head in grudging admiration—not for my nautical ambitions, but for my escape. He got the analogy, and I got the job.

A dozen years later, when I set out to write this book, I intended to explore the subtle yet powerful role of analogy in persuasion. Because while they often operate unnoticed, analogies aren't accidents—they're arguments—arguments that, like icebergs, conceal most of their mass and power beneath the surface. In many arguments, whoever has the best analogy wins.

But as my research progressed, it became clear that analogies do more than just persuade; they also play a catalytic role in innovation and decision making—often with dramatic consequences. From the bloody Chicago slaughterhouse that inspired Henry Ford's first moving assembly line, to the "domino theory" that led America into the Vietnam War, to the "bicycle for the mind" that Steve Jobs envisioned as a Macintosh computer, analogies have played a dynamic role in shaping the world around us.

Despite analogy's importance, many people have only a vague sense of its definition. In broad terms, an analogy is simply a comparison that asserts a parallel—explicit or implicit—between two distinct things, based on the perception of a shared property or relation. In everyday use, analogies actually appear in many forms. Some of these include metaphors, similes, political slogans, legal arguments, marketing taglines, mathematical formulas, biblical parables, logos, TV ads, euphemisms, proverbs, fables, and sports clichés.

Wearing such disguises, analogies can play a much bigger role than most people recognize. Not just because analogies make arguments, but because they often trigger emotions that override the circuits of reason, and sometimes at a subconscious level. All day every day, in fact, we make or evaluate one analogy after the other, because such comparisons are the only practical way to sort a flood of incoming data, place it within the context of our experience, and make decisions accordingly.

The investor Warren Buffett, known for his rich use of analogy, has noted that "You never know who's swimming naked until the tide goes out." In other words, when times are good, it's easy to look good; when times are hard, weaknesses that were hidden beneath the surface are suddenly exposed. The same could be said for analogies themselves: We never know what assumptions, deceptions, or brilliant insights they might be hiding until we look beneath their surface.

Despite the ubiquity and impact of analogical thinking, most people are unaware of just how much this core process influences their decision making. Such lack of awareness comes at a cost. Evidence suggests that people who tend to overlook or underestimate analogy's influence often find themselves struggling to make their arguments or achieve their goals. The converse is also true. Those who construct the clearest, most resonant and apt analogies are usually the most successful in reaching the outcomes they seek.

The ideas in this book draw from the observations, insights, and work of many people, including psychologists, inventors, business leaders, linguists, advertisers, political strategists, legal scholars, neuroscientists, and the world's best pickpocket. A caveat is in order, however. Readers hoping for an exploration of analogy in literature and poetry will not find it in these pages. As rich as those mines are, one could spend a lifetime excavating the metaphors and similes of Shakespeare alone—and many scholars have. This book has a different purpose: helping readers use analogies more effectively to innovate and persuade, and helping them get better at spotting analogies that may sound persuasive but are actually deceptive, faulty, or even dangerous.

Throughout history and across cultures, analogies have animated many of the greatest debates and sparked brilliant discoveries. Similarly, poor analogies have misled many people, companies, and nations into dead ends and disasters. But now, in this age of compounding global challenges, the analogies we embrace—good and bad—will likely produce more serious and lasting consequences. It's in this context that I hope *Shortcut* helps readers become more adept with analogy, enabling them

to sidestep its pitfalls and put its power to good and noble use.

CHAPTER 1

APPLES TO ORANGES

How Our Analogical Instinct Fuels Thought

A confident, square-jawed man is skippering a sailboat when a critical piece of hardware fails, causing the sail to start flapping. As the boat loses headway, the man calmly strips the belt from a spare life vest and uses it to reattach the flapping sail to the boat's long, rigid boom. Filling with wind, the big sail—once again stiff—carries the boat onward through waters that part like a V.

The entire incident, depicted in a TV ad, takes less than thirty seconds. And while the analogy between a flapping sail and the ad's subject—erectile dysfunction—is never explicitly stated by the ad's matter-of-fact narrator, the implicit parallel is clear. Even the name of the advertised drug, Viagra, rhymes with Niagara—an awesome physical wonder whose surging white water is at once natural, powerful, and unstoppable. Coincidence? Hardly.

The utility of the imagery and name depend on the audience's ability, even instinct, to analogize. At its core, this instinct is not just the human urge to seek and compare patterns but to infer abstract concepts from one domain and apply them to another. Unlike other animals (many of which are also able to compare superficial patterns), people can identify and compare domains that have nothing to do with each other except for a common, abstract intellectual scaffolding that we ourselves construct.

Intrinsically, sailing and erectile dysfunction have nothing to do with each other. But once stripped of their particulars, both domains can be said to share—within the context of the ad—two common ideas. First, hard is better than soft. Second, controlling a situation is better than a situation controlling you.

Subtle but strong, the ad suggests a firm congruence between two unrelated domains: Just as a confident captain maintains control of his vessel no matter what, so, too, can the average Joe control *his* vessel in the stormy seas of love. While the analogy is not explicitly stated, it is nevertheless clear. Given the barest minimum of cultural knowledge, our minds process the sailing analogy unconsciously and instantaneously.

This is also what we do with the overwhelming majority of data we encounter in daily life. As Leonard Mlodinow notes in *Subliminal: How Your Unconscious Mind Rules Your Behavior*, about 95 percent of all thought is unconscious. This is because our senses send our brains roughly eleven million bits of information per second—vastly more than our conscious processing capacity, which maxes out at an estimated fifty bits per second. “So if your conscious mind were left to process all that incoming information,” Mlodinow writes, “your brain would freeze like an overtaxed computer.”

But the unconscious brain isn't just discarding all that extra incoming data; it's sorting through it for pattern, contextual relevance, utility, and urgency. A lot of the information we process has to do with keeping the body's many systems running smoothly, no matter what surroundings or activity we

may be experiencing at the moment. Much as an apartment building's maintenance team works behind the scenes to keep the furnace, air-conditioning, plumbing, and electrical systems in good order without bothering the tenants, the mind runs most bodily functions without conscious oversight—most of the time. Only when a task is particularly taxing, uncomfortable, or urgent does the unconscious call up the head office for direction and additional resources.

LOG OR CROCODILE?

Such analogical thinking is as old as humanity. Indeed, without it, we wouldn't be here. Imagine our human ancestors, millions of years ago in East Africa, stopping in the midday heat to drink at a stream. Presumably, those who could more quickly and accurately detect differences in obscure or incomplete patterns—such as the knobby brown snout of a submerged crocodile versus a knotty brown protrusion of a submerged log—would have done better detecting danger and therefore enjoyed a significant advantage in the struggle for survival. Those who were unable to spot the difference, fill in the missing visual gaps, and infer their potential impact became the crocodile's lunch.

As noted, we humans aren't the only animals capable of pattern recognition or the quick reactions that follow. Widespread pattern recognition is the reason that camouflage is so common in nature, as animals have adapted to blend in with their surroundings. Other creatures have adopted the opposite strategy, mimicking the appearance of an unappealing or threatening alternative for those who might otherwise eat them. But while many other animals are adept at such comparison, evidence suggests that only humans are capable of using deep analogical thought to identify and exploit conceptual similarities that go beyond the superficial.

As researchers have explored the function of analogy in human thought, they have found that analogy may lie in the core of all decision making. Psychologists Douglas Hofstadter and Emmanuel Sander, authors of *Surfaces and Essences: Analogy as the Fuel and Fire of Thinking*, are leading experts in the study of analogy. They argue that whether we're ordering food in a new restaurant, looking both ways before crossing a busy street, or deciding that an approaching golden retriever is less threatening than the rottweiler we saw earlier, we're making a series of analogies with past experiences that we've already categorized for easy reference.

Such analogizing is so common that we aren't necessarily conscious that we're doing it. And even when incoming data demands higher-order decision making, the unconscious does a lot of screening and organizing before passing on an executive summary for conscious evaluation. To get a better sense of this, think about how the White House processes, evaluates, and filters the thousands of calls, letters, and e-mails from people constantly clamoring for the president's attention. Only a small subset of messages ever reaches the Oval Office for the president's consideration and potential executive action. Yet some, especially those concerning key legislation or urgent matters of national security, receive priority routing.

Other messages, such as letters from struggling citizens, might be less urgent but still important. And while all the letters the president ends up reading tell stories that are unique in their specifics, they are typically representative examples—analogs—of hundreds or thousands just like them. In actuality, all those other letters “just like” them are not identical in every detail. But they share the same gist, and it is in that context that the president makes the intuitive, analogical leap to grasp the deeper truths they reveal about a bigger social, economic, or political narrative.

Effectively, this is how the brain works. Every day, all of us are constantly evaluating a flood of

incoming data—sight, sound, touch, smell—for their relevance and utility in a wide range of cause-and-effect narratives, which we then use to inform our decision making.

“If one never trusted a single analogy, how could one understand anything in this world? What, other than one’s past, can one rely on in grounding decisions that one makes when facing a new situation?” Hofstadter and Sander write. “And of course all situations *are* in fact new, from the largest and most abstract ones down to the tiniest and most concrete ones.”

ANALOGIES ARE MODELS

In essence, analogies are a type of model that can take virtually limitless forms, well beyond the verbal realm. For example, people use mathematics to help model the future in abstract terms—numbers and processes—that enable them to predict supply and demand in a particular market, explore the ramifications of different retirement plans, or estimate how fast climate change might increase sea levels.

On a simpler level, envision a child’s model train set. However idealized, the image that comes to mind is an analogy of the actual working railroad that inspired it, and serves as a catalyst for imaginary journeys and adventures. Similarly, a bathroom air freshener’s pine scent is supposed to be analogous to the smell of a coniferous forest, just as some industrially produced breakfast syrup—derived from corn—is supposed to taste like real maple syrup. As such, these analogies, whether direct or subtle, are intended to trigger a set of positive sensations, thoughts, and emotions.

In an entirely different context, we interpret Ansel Adams’ iconic photographs of Yosemite to be analogies of the landscape they depict, and accept the recorded words of Dr. Martin Luther King Jr. as the actual voice of the late civil rights leader himself. Were humans to lack this analogical instinct, a photograph that we encounter would fail to trigger the rich networks of ideas, memories, and emotions that endow our experiences with contextual meaning and potential utility.

THINK OUTSIDE THE BUBBLE

The word *analogy* traces its linguistic roots to the Greek *analogia*, a mathematical term meaning proportion, or equality of ratios. Over the centuries, though, the word has taken on much broader, richer meaning. In 1843, John Stuart Mill wrote that there is no word “which is used more loosely, or in a greater variety of senses, than Analogy.” The *Oxford English Dictionary* suggests he may be correct: Some meanings it cites for *analogy* include correspondence, equivalency or likeness of relations, resemblance of form or function, agreement between things, similarity, and the process of reasoning from parallel cases under the assumption that if things have some similar attributes, their other attributes will also be similar.

To some, such a definition of *analogy* may seem too elastic. Admittedly, like a rubber band stretched too far, every definition eventually reaches a breaking point. But while a standardized test question such as “Race cars are to the Indy 500 as _____ are to the Kentucky Derby” is certainly one type of analogy, it is just that—one type. Fixated on such a narrow definition, though, many people often fail to recognize analogy’s true role in our thinking, language, and decision making.

Even ordinary, everyday speech is filled with subtle analogies. Consider the sentence “The stock market skyrocketed today as traders, relieved to see Congress break months of gridlock, embraced

news of a bipartisan budget plan.” On its face, this is a straightforward sentence. But look again, and at least four analogies become apparent. The words *stock market* originally referred to a gathering place to trade livestock. The word *skyrocket* originally referred to a rocket shooting into the sky. The word *gridlock*—originally coined in the 1970s to describe traffic so bad that it brought the flow of vehicles in a city’s street grid to a standstill—traces its own root components to the Middle English *griddle* (a flat forerunner of the ridged waffle iron) as well as the Old English *loc*, meaning bolt, fastening, barrier, or enclosure. Finally, traders can’t physically “embrace” news unless they’re hugging their computers or, perhaps, a copy of *The Wall Street Journal*. Neither do members of Congress “break” gridlock in any literal sense. But through a process of analogical extension, we have enriched these words—and many others such as *understand* and *backstab*—to encompass much more than the physical actions they once connoted.

This makes sense, for we can describe something new only in terms of things we already understand. That’s why we constantly adapt old words to new uses and update their meaning. Otherwise, how could one ever *sail* through school with *flying colors*? Or use a *mouse* to *drag a folder* across a computer’s *desktop* and drop it into the *trash*? In an age when few people sail, let alone fly pennants from their ship’s halyards, and when laptops and wireless Internet access free us from the confines of an office, we hardly ever think of such words in terms of their antecedents. That’s because all of them have become analogies whose new, expanded meanings are entirely familiar and natural.

Most idioms and clichés, in fact, have lost their original, literal meaning. When we take a rain check, spill the beans, become a whistle-blower, sow our wild oats, judge a book by its cover, lose our marbles, or decide that it’s high time we got the hell out of Dodge, we are using analogies whose origins rarely enter our consciousness.

Yet these all remain useful phrases, because they offer a convenient shorthand to distill common but complex ideas, and communicate them quickly. For example, what do we actually mean when we say, “It’s not over until the fat lady sings?” The cliché certainly encompasses a wide range of situations beyond the classic, operatic finale from which it is derived. In its most general sense, the phrase suggests that the final outcome of a contest or struggle has yet to be determined, no matter how likely one outcome may appear. But it can also serve as a beleaguered protagonist’s declaration of determination to prevail, even as time runs short. Alternatively, it can signal a speaker’s knowledge of a pending reversal in fortune, perhaps through a secret plan or trick play, or simply their hope for a timely stroke of good luck, however unlikely that might be.

Closely examined, such idioms reveal that even familiar or mundane analogies can trigger networks of ideas that radiate outward, much as a pebble tossed into a pond creates concentric ripples which in turn create still more patterns when they themselves encounter obstacles.

ANALOGIES CAMOUFLAGE ARGUMENTS

Given this rippling chain reaction of association, the analogies we encounter can dramatically alter the way we think. Sometimes even one-word analogies, which sound innocuous enough, camouflage entire arguments. Think about how many politicians, journalists, economists, and business leaders describe the economy as a commercial “ecosystem.” Implicitly, this description asserts an analogy between a complex web of relationships and interactions in the economic world with a complex web of relationships and interactions in the natural world.

This parallel implies that markets, like ecosystems, are entirely natural, balanced, and self-

regulating, with little need for human oversight or intervention. Another analogy describes the economy as a specific type of ecosystem: a jungle. To many in the world of business, such an analogy would suggest steaming, primordial, and untamed danger—hardly a reassuring thought for those seeking to save for retirement in their 401(k) plans. As Princeton economist and historian Tim Leonard argues, a more accurate analogy for the economy might be that of a garden whose careful cultivation—intervening to encourage desired growth and to eliminate weeds and pests—improves the harvest.

It is not surprising that most people fail to pay close attention to the many subtle analogies they encounter, let alone the corresponding implications. In the thousands of thoughts we have every day, we just don't have the time to examine every analogy. And from an evolutionary standpoint, that's positive, at least on average. If we couldn't quickly and accurately analogize to extract the essence of a situation, we'd have a hard time getting through most days, let alone a lifetime.

AS EASY AS ABC

Research suggests that even one-year-old children can make basic perceptual analogies. By the age of four, most can understand abstract analogies such as “bird is to nest as dog is to doghouse”—that is, each animal lives in its own, special kind of home. Grasping analogies is a slow process at first, but as we begin categorizing what we encounter and steadily enriching those categories as circumstances demand, our understanding of the world expands and accelerates.

A prototypical progression might be how we expand our concept of “mother.” Starting as infants with our own mother, we gradually expand the concept to encompass the mothers of our playmates, then mothers of animals, then mothers of our own parents and other adults, and eventually such abstractions as mother ship, motherboard, and Mother Earth. We keep broadening concepts through the analogical process because it is not only helpful but also a necessity, and necessity is the mother of invention.

Research suggests that it is this ability to make and manipulate increasingly abstract mental representations that explains humanity's ascent to dominance in a world of stronger, faster, sharper-toothed competitors. And much of this ability correlates with a gradual, evolutionary increase in the size of the human braincase; ancient skulls seem to increase in volume in concert with an archeological record of technological advancement. One area of the prefrontal cortex called Brodmann Area 10 seems to play an important role in organizing sensory input and putting plans into action. As this and other areas grew, there was more room for more connections between more neurons, which enabled greater free association and a correspondingly better ability to make analogies.

Over time, this increasing cognitive fluidity enabled people to grasp and exploit increasingly abstract insights. Roughly 35,000 years ago, in Southern Africa, someone carved twenty-nine notches into the tibia of a baboon, an artifact known today as the Lebombo bone, named for the mountains in which it was unearthed in the early 1970s. Given that the number of notches matches the number of phases of the moon, and that modern Bushmen use similar tally sticks as calendars, scholars believe this to be an ancient tool used to track the passage of time, possibly in correspondence with a woman's menstrual cycle.

The Lebombo bone suggests that ancient people had not only a conceptual awareness of time but also the ability to translate observations about the orbit of the moon into a linear two-dimensional analog of time. In short, these early astronomers had the capacity to represent natural phenomena

abstractly and to analyze long-term patterns for cause and effect, at least in terms of menstruation and fertility.

In Europe, contemporaries of the Lebombo bone's creator were painting cave walls with images of the animals they hunted, and carving stone figurines of animals and people. And although these artistic depictions are significantly different from their subjects in form, material, and scale, we can still recognize them easily because most are analogs of familiar, modern descendants.

While the deeper spiritual meaning or purpose of such paintings and carvings may be forever lost to history, they still tell an important story. Their existence reveals that early humans had developed the ability to create and manipulate symbolic representations of living beings. This, in turn, suggests an ability to see themselves and the animals in their world as objects within larger systems. Such observational detachment likely helped people make decisions that improved their chances for survival. Even the decision to worship a totem might have endowed a worshipper with greater determination to prevail—an invaluable psychological resource in challenging times.

Such prehistoric representational art eventually evolved into writing, as Mesopotamian and Egyptian scribes began developing various pictographic scripts that over time became increasingly abstract. Then, about 3,700 years ago, an unknown scribe (or scribes) in what is today the Sinai Desert recognized that, among the seven hundred Egyptian hieroglyphs then in common use, nearly all comprised a limited number of sounds. Seeking a more flexible, convenient way to represent ideas than these traditional, cumbersome pictograms, these scribes distilled the most common sounds into twenty-two symbols, which today we call letters. Each of these letters was an abstract, visual analog derived from a hieroglyph, or part of a hieroglyph, whose specific meaning was abandoned when its phonetic value was pressed into service.

This intellectual breakthrough produced the world's first phonetic alphabet, which modern scholars call North Semitic. Its logic of one symbol representing one sound—rather than one symbol for every word, syllable, or concept—made writing simple to learn and easy to use, not just for a few highly trained scribes but for a relatively broad population.

FINDING OUR WAY

For the first time in human history, people had a practical way to write down ideas of infinite complexity and transmit them over time. This meant that people could accumulate and distribute knowledge with unprecedented ease, which accelerated learning, exploration, trade, economic growth, and scientific progress. As one of history's most innovative tools, the North Semitic alphabet was so practical that it was adopted and adapted for thousands of years to come, evolving into alphabets that included Phoenician, Greek, Hebrew, Arabic, Latin, English, Persian, Russian, and the scripts of Ethiopia and the Indian subcontinent, including Sanskrit.

Another ancient example of the analogical instinct at work finds expression in the navigational feats of early seafarers who, beginning about 5,000 years ago, began sailing east from Southern Asia into the vast reaches of the Pacific, eventually populating thousands of far-flung islands. In retrospect their navigational achievements are especially impressive because currents or accidental drift cannot account for the settlement of certain islands or archipelagos, including those of Easter Island, New Zealand, and Hawaii.

So how did these sailors navigate? Long before the invention of the compass and sextant, these aboriginal voyagers invented a range of tools to guide their canoes to isolated atolls in a vast and

unforgiving sea. Among others, these included woven “swell charts” to track progress in relation to wave patterns, miniature celestial maps carved inside of gourds, and corresponding “wind compasses” that correlated prevailing winds with the migration of stars. Given the navigational challenges of such long voyages, during which small errors could have mortal consequences, a strong analogical instinct was critical. Only those who honed it were likely to survive and pass on their knowledge to successive generations.

Even today, with all the latest technology, many of us still rely on the analogical instinct to navigate. When we use Google Maps on an iPhone, for example, we track our movement, represented as a pulsating blue dot on a map, which is a two-dimensional analog of three-dimensional geography. As we move, we compare this dot with corresponding clues from our actual, physical surroundings, such as street signs, highway exits, landmark buildings, parks, rivers, and other natural features. Google’s Street View feature makes this process especially easy. If we were incapable of analogical reasoning, such digital maps—or any printed map—would be useless.

This is why, when we complain about a bad map, we’re really complaining about the disappointing quality of a given analogy. Over time, maps generally become better, as cartographers update their charts, using more accurate and detailed information. A good example is the evolution of maps of what is today the state of Michigan, the geographic borders of which are defined almost entirely by the coastlines of the Great Lakes. Originally, these maps were largely conjecture, based on verbal descriptions by natives and the crude observations of European fur traders who plied the waters in large birch-bark canoes. Later, explorers and trained surveyors took more accurate measure of the geography, and today satellites provide more detailed information yet—all of which yield progressively more accurate two-dimensional analogs of the actual geography.

In the end, a map’s accuracy matters only to the level of detail that its users need to guide navigation. Today, when native Michiganders are asked where they’re from, many will use their right hand as a map, holding it up as if swearing an oath, and point out their hometown’s “location” with their other hand. Why? Because Michigan’s Lower Peninsula bears a striking resemblance to a mitten. People who live in Cheboygan, just south of the Straits of Mackinac (which separate the Upper and Lower Peninsulas), might say they’re from the “Tip of the Mitt.” Similarly, residents of Bad Axe, about one hundred miles north of Detroit, live in the “Thumb.”

In a second, handy coincidence of geography and physiology, Michigan’s Upper Peninsula is also shaped like a mitten, but for the left hand, this one extended as if offering a handshake rather than taking an oath. Once it is explained, even those who have never visited the Great Lakes State understand the geographic analogy, because their mind—visualizing a comparison between those hands and a map of Michigan—makes the conceptual leap.

But *how* does the mind actually make that leap? How does it identify the intrinsic essence of something, whether that something is an object, a situation, a living thing, or even just an idea? And how does one person make an analogy that triggers the intended associations in the mind of another, especially when most of the assumptions or implications of any given analogy are never explicitly mentioned?

LOST IN TRANSLATION

Benjamin Bergen is a neuroscientist at the University of California, San Diego, and an expert in how the brain translates perception into meaning. As he notes in his book *Louder Than Words: The New*

Science of How the Mind Makes Meaning, symbols and words don't have any intrinsic meaning except that which we assign to them. For example, the words *dog*, *chien*, *sag*, and *perro* all refer to the same animal, respectively, in English, French, Farsi, and Spanish. Indeed, the diverse vocabularies of more than six thousand languages attest to the arbitrary nature of such linguistic labels. "Simply identifying and arranging symbols in some language, even if those symbols represent something in the real world isn't enough to make meaning," Bergen writes.

Rather, much of the meaning we assign to things—whether they're physical objects or abstract ideas—flows out of our own direct, accumulated experience with them. According to Bergen, one of the core aspects of human cognition is not just that we know superficial qualities of cartoon things, but that we intuit about their less apparent qualities, too. This ability to identify something's intrinsic properties can be exceptionally useful, even vital.

What would your reaction be if a potential business partner pulled out a long contract with lots of fine print, uncapped a pen, and suggested you sign it on the spot? Chances are, based on rudimentary knowledge of contracts and their potential for complexity, you'd defer signing until your lawyer could review the document and suggest any necessary changes.

Alternatively, imagine that you are walking through a city at night, when you begin to suspect that a stranger across the street is following you. You might seek refuge in the nearest crowded, well-lit place, pull out your phone to call 911, or begin thinking of ways to defend yourself. After all, we've seen analogous situations unfold hundreds of times on TV and in the movies—and they often don't end well.

But what's amazing about the human mind, as opposed to the minds of other animals who also possess a fight-or-flight instinct, is that people can imagine things that are entirely novel, nonexistent, or utterly impossible. As Bergen notes, when people are instructed to think of a flying pig, most can easily imagine one in their minds, even though such a creature is completely fictional.

Some people might envision one with two feathered wings attached to their front shoulders, much like a Renaissance angel. Others might envision a pig wearing a caped superhero outfit, leaping tall barns in a single bound. Still others might recall Miss Piggy, the Muppet, gracefully airborne in the arms of guest star Rudolf Nureyev in *Swine Lake*, or picture a wild boar sitting in the cockpit of an F-16 fighter jet, sporting a pair of Ray-Bans. In short, when presented with the words *flying pig*, the actual image we construct in our mind's eye depends on an infinitely rich array of inputs and experiences that vary from person to person.

Bergen marshals significant new laboratory and neurological evidence to support the embodied simulation hypothesis—a theory suggesting that we understand the words we encounter by actually simulating, in our minds, the experience the language describes. Envision a dolphin leaping from the ocean. Imagine the smell of brewing coffee on a cold winter morning. Hear the sound of a high school marching band in a Fourth of July parade. Recall the exhaustion you felt climbing a long flight of stairs, helping a friend move into a new apartment.

Now, depending on your personal experience, some of these words may evoke more vivid mental imagery than others, but to speakers of English, all will trigger the firing of neurons that, to one degree or another, echo patterns created by these actual experiences in our lives, or secondary knowledge of such experiences. According to Bergen's research and that of others, this is because we are using much of the same basic equipment in the brain to *imagine* a leaping dolphin as we do when we actually *see* a leaping dolphin. Similarly, if you are told to think about the actual motions you make in opening your front door, your brain will fire many of the same neurons as it does when you actually *do* open your door, except that in the imagined scenario, the brain inhibits the actual

execution of those motions.

GETTING A GRIP ON REALITY

Surprisingly, this process of embodied simulation also seems to occur when we're thinking about abstract concepts such as reality, rejection, interest rates, joy, time, or even the very notion of idea. Building on the seminal work of linguist George Lakoff and philosopher Mark Johnson, Bergen argues that our brains manipulate such concepts by ascribing physical, perceptual, or spatial properties to them, as when we say:

She's losing her *grip* on reality.

Repeated rejection had left him *bitter*.

When the lab tests came back negative, his spirits *rose*.

The instant she agreed to marry me, I was *filled* with joy.

As his manager announced the annual sales quota, the salesman thought: "That *stinks!*"

Much as we might slip a bridle and reins onto a horse to help direct it as we choose, we harness abstract concepts by endowing them with qualities we perceive in the physical world—volume, taste, direction, quantity, and smell, among others—to help manage them more easily in our minds.

In their classic 1980 book, *Metaphors We Live By*, Lakoff and Johnson explore the ways in which we conceptually lasso time, a neat linguistic rope trick that gives us some rudimentary control over the idea of time but, alas, not time itself.

Often, we endow time with substance and quantity—"We're *running out of time*. There just *aren't enough hours* to get the job done." We also put time in a physical location, either in front of or behind us—"When I leave for vacation, I'm going to *put this whole year behind me*. That's why I'm really *looking forward to my time off*." Sometimes we think about time itself as moving—"He was supposed to be the future of the Democratic Party, but *time passed him by*." Or "As she waited for the bus to arrive, *time really started to drag*." Or "For a moment, when he saw her walk into the room, *time stood still*."

We also give time the power of agency—"I can't be sure at the moment, but *time will tell*." Or "She was very beautiful in her twenties, but *time took its toll*."

Apparently, this capacity to understand language—even language that is abstract—comes from the way we have adapted old perceptual systems to new and powerful uses. As Bergen sums it up, "Evolution has cobbled together a new machine from old parts it had lying around in the junkyard of the brain."

A \$60 MILLION MASTERPIECE

In the dark early hours of August 8, 1963, an intrepid gang of robbers hot-wired a six-volt battery to a railroad signal not far from the town of Leighton Buzzard, some forty miles north of London. Shortly

the engineer of an approaching mail train, spotting the red light ahead, slowed his train to a halt and sent one of his crew down the track, on foot, to investigate. Within minutes, the gang overpowered the train's crew and, in less than twenty minutes, made off with the equivalent of more than \$60 million in cash.

Years later, Bruce Reynolds, the mastermind of what quickly became known as the Great Train Robbery, described the spectacular heist as "my Sistine Chapel." To some, the comparison with Michelangelo's masterpiece might seem as audacious as the theft itself. Yet whether one agrees with Reynolds' analogy, we understand the point he's trying to make. Still, how is it that we are able to make the conceptual leap from a twentieth-century British train robbery to a sixteenth-century Vatican chapel, and grasp the parallels? Analogy researchers believe this happens through a process called structure mapping.

First advanced in the early 1990s by Dedre Gentner, a psychology professor at Northwestern University who directs the university's cognitive science program, structure mapping describes how we map knowledge from a conceptual base (such as the Sistine Chapel) onto a target (the Great Train Robbery) in a way that preserves the structure of relevant relationships within each, while discarding what we consider to be irrelevant differences. Evidence suggests that we tend to map this knowledge according to higher-order relations—the highest order we can identify.

In this case, based on our knowledge of the creativity, planning, and extraordinary skill that went into creating the Sistine Chapel, we infer that similarly elevated levels of creativity, planning, and skill were required to successfully intercept and rob a Royal Mail train loaded with 120 bags of cash and get away with the loot.

In processing Reynolds' analogy, we intuitively disregard all the obvious differences between train robbery and Renaissance art. Reynolds, in asserting their equivalence, implies an associated, higher-order relation: the parallel between Michelangelo (the genius who conceived and painted the Sistine Chapel) and himself (the genius who conceived and led the robbery).

Like the Sistine Chapel, the Great Train Robbery stands in a class of its own in its audacity and execution. This in turn implies an even more abstract, higher-level relation between the two domains. Those who admire Michelangelo as an artistic genius should admire Bruce Reynolds as an artistic genius, too. Those who would paint the competing masterpieces with a different moral brush are missing the point; art is art after all, so give the artist his due.

Even for those whose sense of morality constrains them from accepting the equivalence of art and robbery, some might still concede the basic point that both Michelangelo's and Reynolds' most famous works were arguably the best in their respective categories. It's the same idea, in principle, a calling a pricey vacuum cleaner the Rolls-Royce of vacuums, or describing a generous health insurance policy as a Cadillac plan.

But any given analogy's "truth" is intrinsically subjective. Was the American occupation of Iraq modern Vietnam? Is hip-hop the new jazz? Is Washington just Hollywood for ugly people? Argue away—there are no right or wrong answers, at least not by any purely objective standard.

Once we pay conscious attention to the words we use and the way most people talk, it quickly becomes apparent what a central role analogy plays and the many forms it can take, including that of metaphor, simile, allegory, idiom, parable, aphorism, cliché, euphemism, and proverb. Without people's analogical instinct, none of these rhetorical devices would be possible, let alone useful.

Even the ways we describe basic concepts in our lives are analogical in nature—life is a journey, time is money, the body is a machine, the mind is a computer, and love is a roller coaster. We accept these because we perceive that the paired concepts, however different in actuality, are indeed alike in

important ways.

While a member of the Yanomami tribe who has lived his entire life in the Amazon rain forest without exposure to money, machines, computers, or roller coasters might not understand these culturally dependent analogies, those of us who live and work in modern, technological societies grasp their meanings almost intuitively. And in grasping these intended meanings, we embrace their “obvious” truths and dismiss their myriad dissimilarities.

QUICK TO JUDGE

Daniel Kahneman is a psychologist whose research into human decision making earned him a share of the 2002 Nobel Prize in Economics. In his 2011 book, *Thinking, Fast and Slow*, Kahneman argues that, conceptually, two mental systems drive the way people think. What he calls System 1 works quickly, intuitively, and emotionally. System 2 works more slowly, logically, and deliberately—and often only to justify the impulsive decisions of System 1. Both systems operate within every person’s mind, although some people tend to favor one over the other.

Just as most people will generally exert the least amount of energy necessary to complete a given physical task, such as taking an elevator instead of climbing stairs, a similar “general law of least effort” also applies to people’s cognitive efforts. Research suggests that this tendency might be due to the fact that challenging mental activity appears to require more of the body’s basic fuel, glucose. When we avoid hard thinking, we save mental energy, literally. Bluntly, we’re programmed to be lazy and are inclined to follow the path of least resistance.

Usually, such quick thinking works to our advantage. Much as computers use algorithms to compress digital data, people’s minds seek efficient ways to compress mental data. One tactic we use is to record information outside our brains in numbers, written words, images, and recorded sound. Another tactic, this one internal, is remembering stories. And many analogies are just that—compressed stories. Fables, which owe their instructive power to the analogical instinct, illustrate this well. Aesop’s “The Boy Who Cried Wolf” has been shortened to the analogical expression “crying wolf.” In another fable, “The Fox and the Grapes,” a fox becomes frustrated because he cannot reach clusters of juicy grapes that, however tantalizing, hang just out of reach. Giving up, the fox declares they looked sour anyway—a sentiment that generations have distilled into the expression “sour grapes.”

We may take these quick analogies for granted, but the ideas they convey are actually quite complex. And the degree to which an analogy is or is not “accurate” in a given circumstance is irrelevant; it is the feelings and ideas they evoke that make them so powerful.

This may be one reason that effective analogies, which are essentially compressed and spring-loaded stories, often enable people to seize the high ground in an argument. In offering a coherent narrative, they allow their creators to deftly sidestep the quicksand of competing “facts” and more closely approach the intellectual and emotional core of their argument.

THE STIGMA OF A TOILET SEAT

But when narratives conflict, we’re forced to evaluate competing analogies and judge them in relation to each other. In late 1957, for example, the Ford Motor Company introduced a new line of cars

intended to appeal to upwardly mobile drivers. The car, whose initial clay model reportedly drew a standing ovation from Ford executives, was billed as “the revolutionary car of the future.” In a complimentary preview of the car, *The New York Times* likened its horizontal taillights to “the graceful wingspread of a sea gull” and suggested that the car’s vertical front grille gave it a “distinctive continental flair.”

Analogical descriptions were necessary, because the car would be strikingly different in appearance from all other cars on the market, and Ford withheld all images of the car until its official launch. The analogy between the taillights and seagulls was especially apt, because it was both visually accurate and emotionally evocative. Seagulls are extraordinarily graceful in flight. Whether they’re swooping across the blue sky or floating in place with the slightest of effort, they rarely need to flap their wings. More than a few weekend sunbathers, lying on a beach and dreading their return to work on Monday, have gazed upon a gull’s freedom with a certain envy. It’s no coincidence that the cliché “free as a bird” captures that very emotion. Given such a wealth of positive associations, who wouldn’t want a car that evoked feelings of soaring grace and freedom?

Thanks to a masterful public relations campaign, Ford built up such excitement for this new car that, on the day it was released, some three million people flocked to dealerships to get their first look at the oddly named Edsel. But their reactions were, on the whole, dramatically less enthusiastic than that of *The New York Times*. Quickly, people began lampooning its front grille as a horse collar and a toilet seat, among other unflattering descriptions. Compared to associations with a seagull soaring in the ocean breeze, those evoked by a working draft horse and a toilet seat are more earthbound. As a consequence, Ford found itself on the defensive, insisting that the car really *was* attractive.

Compounding Ford’s problems, *Consumer Reports* criticized the Edsel’s quality. Also, between the time it was conceived and launched, a recession had undermined the purchasing power of its target market. Given this, it would be inaccurate to attribute the Edsel’s dismal reception solely to public descriptions of the front grille. But all the millions of dollars that Ford poured into advertising and marketing the car couldn’t overcome the public’s unflattering analogies.

The public’s descriptions of the Edsel offer three instructive insights into the analogical instinct. First, one can only describe or explain something new in an effective way by using concepts with which an audience is already somewhat familiar. In the late 1820s, it was common to call a steam-powered locomotive an iron horse because this novel, powerful machine was starting to replace the horses that initially pulled railcars along tracks. Similarly, all the sooty smoke from the Industrial Revolution, combined with fog, gave rise to the word *smog*. In the case of Ford’s new automobile, its unconventional design left everyone who saw it searching for a way to describe it.

Second, the more familiar we are with the subject matter of a given analogy, the easier the analogy is to grasp and the more likely it is to resonate. As such, “toilet seat” would likely beat out “horse collar” as a descriptor because, by the 1950s, affluent suburban Americans—this car’s target market—were much more familiar with toilet seats than with equine farm equipment.

Third, due to the way our minds perform embodied simulation, an explicit visual analogy will generally communicate an idea more quickly and effectively than a vague, abstract description. This is because specific images, especially of something familiar, will trigger bigger and more resonant networks of associated images, ideas, and emotions. People in the Western world often associate toilet seats with defecation, which can in turn trigger one of the oldest and strongest human emotions—disgust. Compare that to the emotional power of “continental flair.” Well, what exactly *is* continental flair? Certainly, with enough time and cultural literacy, one could articulate what the critic probably meant by that description, but to communicate the subtleties of such an aesthetic sensibility would

require a lot more effort by critic and reader alike. That's why describing something as specific and familiar as a toilet seat is the stickier analogy.

Although it is highly unlikely that anyone in 1957 puzzled their way through this battle of analogies with such conscious deliberation, they didn't have to; most people took one look at the car and rendered a quick verdict—it stank. The toilet seat grille just happened to symbolize their gut reaction to the car as a whole.

Entirely apart from its unpopular design and the analogies used to describe it, the name Edsel didn't help the car's sales either. Originally, Ford had code-named the project the E-Car—the *E* stood for *Experimental*—and researched and rejected thousands of possible names. Then, in a meeting of the company's executive committee, Ford's chairman of the board Ernest Breech suggested naming it after the late Edsel Ford, who was Henry Ford's son and had served as the company's president before his death in 1943.

"He was brown-nosing Mr. Ford," the Edsel's former public relations director, C. Gayle Warnock told *The Washington Post* in 2007. "I knew nobody would like that name," he said. "When they did interviews and asked about Edsel, people always said, 'Did you say pretzel?'"

Edsel had never been a popular name in the United States, and was not even among the top 1,000 when the car was launched. To compound problems, its phonetic similarity to a cheap, common snack didn't communicate the upward mobility that Ford intended the car to symbolize. In a curious twist, some etymologists trace the origin of the word pretzel to the medieval Latin description of an indigenous, looping German pastry known as folded arms. The snack's name makes total sense: Cross your arms over your chest, and you'll discover they actually do resemble a traditional pretzel. Ironically, in the mid twentieth century, "crossed arms" turned out to describe the body language of thousands of skeptical customers enduring an Edsel dealer's sales pitch.

Whatever the cause, Edsel sales lagged from the start. Having projected to sell 200,000 the first year, Ford sold only 63,100 in the 1958 model year, and fewer than 45,000 the next. Even a desperate promotional effort, in which people who test-drove an Edsel were offered the chance to win a pony, failed to stir up sales. Optimistically, Ford had purchased a thousand ponies and shipped them throughout the country, where Edsel dealers tethered them outside their showrooms. And while the contest did attract some families whose kids begged their parents to win them a pony, both dealers and "lucky" winners soon came to appreciate why cars had replaced horses in the first place; it wasn't just a matter of feeding the ponies, it was cleaning up after them. Soon, dealers were shipping the animals back to Detroit.

In late 1959, limping into its third year of dismal sales—a paltry 2,486 cars—Ford canceled production and shut down the entire Edsel division. The Edsel, which cost the company more than \$2.7 billion in today's dollars, was such a colossal, spectacular, and public failure that its name quickly became an analogy itself, a synonym for any big new product so overwhelmingly and immediately unpopular that people refuse to purchase it.

Generally, nobody wants to take the blame for failure, especially a big one. As President John F. Kennedy famously noted after the 1961 Bay of Pigs fiasco, "Victory has a thousand fathers; defeat is an orphan." But in the case of the Edsel, chief designer Roy Brown Jr. took the fall. Despite going on to help design a number of highly successful vehicles, such as Ford's Econoline van, he was always remembered for his most unpopular effort, the car whose design he defended until his death in 2013 at the age of ninety-six.

"A lot of people said, 'Hey, it's Roy Brown's fault,'" Brown told an interviewer, years after the Edsel debacle. "I did what I was told and I did a good job of it." Nevertheless, he lamented, "There are

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